

DISINFECTION AND STERILIZATION OF DENTAL INSTRUMENTS AND MATERIALS

APPROVED FOR PUBLIC RELEASE
DISTRIBUTION IS UNLIMITED

HEADQUARTERS, DEPARTMENT OF THE ARMY
JULY 1989

READER
FICHE

best copy available

D 101 251

**DISINFECTION AND STERILIZATION OF DENTAL
INSTRUMENTS AND MATERIALS**

Approved for Public Release Distribution is Unlimited
--

CHAPTER		Paragraph	Page
	1. INTRODUCTION		
	Purpose	1-1	1-1
	Responsibilities	1-2	1-1
	General	1-3	1-1
	Universal precautions	1-4	1-4
	Aseptic techniques	1-5	1-5
	2. TECHNIQUES AND PROCEDURES		
	General	2-1	2-1
	Phase I—Decontamination	2-2	2-1
	Phase II—Sterilization	2-3	2-3
	Phase III—Storage and care of sterile instruments and materials	2-4	2-3
	Factors contributing to failures	2-5	2-4
	Consideration for proper sterilization	2-6	2-4
	3. INFECTION CONTROL IN DENTAL CLINICS, DENTAL LABORATORIES, AND AREA DENTAL LABORATORIES		
	Barrier requirements	3-1	3-1
	Disinfection procedures	3-2	3-1
	Rushed cases	3-3	3-1
	Contact areas and benches	3-4	3-1
	Direct patient care facilities	3-5	3-1
	REFERENCES		A-1
APPENDIX A			
GLOSSARY			Glossary-1

*This bulletin supersedes TB MED 266, 15 May 1975, and so much of TB MED 2 as pertains to sterilizing dental material.

CHAPTER 1

INTRODUCTION

1-1. Purpose. This bulletin provides dental health care workers information concerning methods and means of disinfection and sterilization of dental instruments and materials. Vigorous safeguards, exacting techniques, and controlled professional standards are required to protect the health and welfare of persons receiving treatment at military dental facilities. All measures are aimed at reducing the risks of transfer of infection, elimination of bacterial, viral, and fungal reservoirs, and establishing discipline for asepsis.

1-2. Responsibilities. *a.* Commanders of dental activities will ensure compliance with practices stated within this bulletin.

b. The quality assurance committee will administer and monitor the unit's sterilization and infection control program to—

(1) Provide an orientation briefing to newly assigned personnel prior to the individual being assigned to patient treatment areas and/or areas involved in handling contaminated materials per the local infection control standing operating procedure (SOP).

(2) Ensure that formal documentation occurs reflecting orientations and sustainment training in the area of infection control.

(3) Ensure review of sterilization log books and expiration dates (signed and dated to reflect review per local SOP).

(4) Ensure that sustainment training occurs to keep personnel current in the area of infection control.

c. Supervisors of the sterilization process will ensure that personnel performing the sterilization tasks have—

(1) Documented formal training in the sterilization process.

(2) Orientation briefing on the local sterilization SOP.

(3) Sustainment training (semi-annual) in the areas of sterilization or infection control.

1-3. General. The variety of instruments and materials utilized in a dental facility present significant problems and demands on techniques of decontamination, disinfection, and sterilization. All items of the dental armamentarium that may puncture or penetrate oral mucosa and introduce foreign agents into the blood stream will be sterilized when possible.

a. Methods of sterilization.

(1) *Saturated steam under pressure.* This is the preferred method to be used in Army dental care facilities. Saturated steam under pressure is the recom-

mended method of sterilization for all dental material unless otherwise indicated by the nature of the instruments or recommended by the materiel manufacturer. Users must have a basic understanding of the operations of the type of sterilizers being used.

(a) Steam type autoclaves produce saturated steam at 250 to 270 degrees Fahrenheit which must be maintained for 30 minutes at 15 to 30 pounds per square inch (psi) pressure after reaching the 250- to 270-degree temperature to be effective. This type of sterilization may corrode instruments.

(b) Methods of steam sterilizers include: Gravity displacement, prevacuum, and vacuum pulsing. These methods are used in patient care when sterility is essential.

(2) *Steam and chemical sterilizers.* These machines produce non-saturated steam at 260 degrees Fahrenheit by mixing chemicals with very little water (dryness of instruments is extremely necessary). Chemical sterilization does *not* corrode instruments and will produce sterilization at 20 to 22 psi pressure and 260 to 275 degrees Fahrenheit for a 20-minute cycle.

(3) *Ethylene oxide (EO).*

(a) EO is the choice method for sterilization of heat-labile and moisture-sensitive medical items, supplies, and equipment.

(b) Due to its toxicity, potentially flammable, and explosive nature, EO must be used with caution. Users must have a basic understanding of EO system hardware and potential sources of EO release to the environment. Efforts should be directed toward decreasing ambient levels of EO in the worker environment and residual levels in sterilized devices. Operation of the EO sterilizer must adhere to the standards established in the occupational health program contained in the Accreditation Manual for Hospitals produced by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO).

(c) All EO sterilized items are to be aerated in a mechanical aerator. Manufacturers of medical devices provide in writing the sterilization and aeration instructions to be followed when their products are required to be EO sterilized.

(4) *Dry heat.* This may be used for the sterilization of anhydrous oils, greases, and powders, burs, and instruments with cutting surfaces.

(5) *Chemical sterilization and disinfection.* Steam sterilization is the preferred method to be used to sterilize dental instruments; nevertheless, some instruments cannot be subjected to high temperatures. In a field environment when equipment is not available,

chemical sterilization and disinfection is recommended. Four basic types of chemical agents can produce *disinfection*. One agent (glutaraldehyde) under optimum conditions can produce sterilization.

(a) Disinfectants are classified as high, intermediate, or low relative to their effectiveness against vegetative bacteria, bacterial spores, tubercle bacilli, and viruses. In one concentration, chemical agents may kill bacteria while in other concentrations only inhibition of bacteria or stimulation of bacterial growth may occur.

(b) Chemical disinfectants that should *not* be used in the dental environment are—

1 Phenol that is not sporicidal, toxic to tissue, and ineffective against hepatitis viruses.

2 Quaternary ammonium compounds that are inactivated by organic matter, not sporicidal or tuberculocidal, not routinely active against gram negative microbes, and do not inactivate hepatitis viruses.

(c) Disinfectants recommended for the dental environment require the following properties. (Ref, the Centers for Disease Control (CDC) HIV guidelines (Jun 85). (See app A, sec III).)

1 Be capable of rapidly killing pathogenic microorganisms, including tubercle bacillus and inactivating hepatitis viruses.

2 Be non-destructive to items to be disinfected.

3 Be simple and uncomplicated to use effectively.

4 Be nontoxic. (Formaldehyde meets CDC guidelines but is too toxic for routine use).

(d) Recommended disinfectants. (Shelf life, use life, and re-use life are different; follow the manufacturer's instructions. When using disinfectants do not add instruments to an existing disinfection process.)

1 Chlorine solutions composed of household bleach or 5.25 percent hypochlorite solution mixed at 1 part per 10 parts water. Exposure time ranges from 10 to 30 minutes. *Prepare solutions daily* due to instability of chlorine solutions and properly discard after each use. All bleach solutions can harm skin, eyes, and colored clothing. Corrosion of instruments may occur.

2 Two percent glutaraldehyde is a compound that can disinfect in 10 minutes (depending upon the formulation). Sterilization can be achieved after 6.75 to 10 hours with the correct formulation. Irritation of skin, eyes, and respiratory mucosa may occur; consequently, avoid direct contact and wear gloves, mask, and eye protection. Rinse all dental items with sterile water after contact with glutaraldehyde. Hand dry with sterile towels to avoid "spotting" and oxidation.

3 Iodophors is a preparation that causes intermediate disinfection in 10 to 30 minutes with most commercial preparations. Mix one part iodophor

with 213 parts distilled water. Residue stain from iodophors is removed after drying with a 70 percent alcohol solution.

(e) Containers for chemical disinfection should be pyrex, glass, or stainless steel and/or combinations thereof. No container should be used without a lid or suitable cover to keep out dust and air contaminants and to reduce evaporation. Many instances may require numerous containers for separate disinfection processes for each set of instruments. Glass beakers are containers of choice for dental rotating tools such as burs, stones, and disks.

b. *Sterilization process monitoring.*

(1) *Chemical indicator (CI).*

(a) CIs are physical or chemical devices employed to monitor one or more sterilization process parameters to detect failures in packaging, loading, and/or sterilizer function.

(b) Since there are presently no official performance standards for CIs available, users are advised of the following:

1 Selection should be based on reliability, safety, efficiency.

2 Manufacturers of CIs provide written instructions to interpret indicator results, safety, and performance characteristics of the sterilization process monitor.

3 A CI will be considered an adjunct to a sound biological indicator (BI) *not* a replacement for it.

(c) A CI must be used with every package processed.

(d) Caution should be taken that the ink side of the CI does not contact the metal surface of items being sterilized.

(2) *BI.*

(a) The purpose of biological monitoring is to document the effectiveness of specific sterilization cycles under conditions of use.

(b) A biological test will be done a minimum of once weekly on dry heat, steam sterilizers, and steam and chemical sterilizers (nonsaturated chemi-clave). A biological test will be done with every EO load.

(c) *Bacillus stearothermophilus* spores will be used to test steam sterilizers and non-saturated steam.

(d) *Bacillus subtilis* spores will be used to test dry heat and EO sterilizers.

(e) Bowie Dick type test for prevacuum and vacuum pulsing sterilizers will be run on each day of use. This test will test steam penetration by demonstrating the adequacy of air removal from the chamber and load, or the presence of an air leak.

(3) *Monitoring mechanical operation.*

(a) The operator must ensure that the device is functioning properly. Monitoring the mechanical op-

eration involves observation of time and/or temperature recording devices and temperature and/or pressure gauges. These must be examined and recorded by the sterilizer operator at the beginning and end of each sterilizing cycle. A sterilizer with built in paper recording devices requires the operator to record the load control number, his or her initials, and the date.

(b) When time and/or temperature recorders are not provided, it must be emphasized that timing of the sterilization cycle does not begin until after the maximum temperature (250 to 254 °F) and 15 pounds pressure is obtained.

c. Labeling of sterilization loads.

(1) At no time should any item be stamped with a load control number until after the item has completed the sterilization cycle. Sterile items will be stamped or marked in accordance with this technical bulletin indicating the date on which sterility expires and the load control number.

(2) All parts of packages (gauge of needle, syringe size, suture size, suture material) should be clearly labeled on the exterior of opaque wrapping so that the contents of the pack may be easily ascertained by any user. (Ink, pencil, or stamped information on woven wrapping material is not recommended.)

(3) All supplies subjected to a sterilizing cycle (autoclaving or EO) will bear an identification load control number after completion of the sterilization process.

(4) The load control number will consist of seven digits as follows:

(a) The first two digits indicate the numerical designation of each sterilizer.

(b) The third, fourth, and fifth digits indicate the calendar day of the year, for example, 001 through 365 days.

(c) The sixth and seventh digits indicate the number of the sterilization load during the 24-hour period.

Example:

Digits:	1,2	3,4,5,	6,7
	09	215	03
	S	D	24 HR
	T	A	L
	E	Y	O
	R		A
	I	of	D
	L		
	I	Y	N
	Z	E	U
	E	A	M
	R	R	B
			E
			R

(5) All packages will be marked visibly with an expiration date.

(6) Color coding systems may be used only as an adjunct to the required expiration date and load control number.

d. Recordkeeping and care of sterilizers.

(1) Mechanical process control monitors.

(a) Temperature and/or pressure gauges must be examined by the operator, the time noted and recorded by the operator at the beginning control number, and the operator's identification recorded. (The sterilization cycle does not begin until temperature (250 to 254 °F) and 15 PSI pressure is obtained. A clock time and a written notation should be made for each sterilization cycle by the operator.)

(b) Prior to removing materials from the sterilizer, the sterilizer recording must be examined and initialed to verify attainment of adequate temperature and duration of exposure.

(c) Recordings must be maintained in the immediate area of the sterilizer. Dental clinics inspected by the JCAHO will keep recordings from one inspection to the next. (See AR 25-400-2.)

(2) Laboratory results of biological testing on sterilizers will indicate any positive readings after 24 to 48 hours of incubation. A final written report is then forwarded back to the sterilizer user.

(3) A log book will be maintained with the following information:

- (a) Sterilizer number.
- (b) Date.
- (c) Load control number.
- (d) Expiration date.
- (e) Contents of load.
- (f) Operator.
- (g) Result of biological tests.

(4) Biological test results will be kept on file in the using area for a minimum of 12 months. Biological test results may be destroyed upon approval and recording of results by the quality assurance committee and entry into their minutes.

(5) Operator preventive maintenance procedures are published by the manufacturer or may be contained in FM 8-38. A daily cleaning of sterilizers is imperative. Abrasives such as steel wool should not be used on walls. A solution of trisodium phosphate (1 ounce to 1 quart of water) is a recommended cleaning agent. Walls should be thoroughly cleaned and the chamber drained after each day of operational use. This is an operator responsibility, not a medical maintenance function.

(6) Qualified medical maintenance technicians should be called for repair of controls or replacement of parts when indicated. Medical maintenance personnel will maintain maintenance records in accordance with TB 38-750-2.

e. Shelf life.

(1) The shelf life of sterilized items is event-related and not time-related. It is dependent upon the quality of the wrapper material, the storage conditions, the conditions during transport, and the amount of handling. Shelf life is not simply a matter of sterility maintenance, but is also a function of materials life and inventory control. The maximum shelf life is as follows:

(a) Nonwoven, nylon, plastic, plastic and paper laminate—6 months.

(b) Papers and wovens—72 hours.

(c) Papers and wovens, placed in hermetically sealed or envelope (taped closed) protective covers (after a sufficient cooling period following the sterilization cycle)—6 months.

(d) Papers and wovens removed from hermetically sealed or envelope protective covers and not opened or contaminated—72 hours.

(e) Commercially prepared sterile items will be considered sterile unless the integrity of the packaging has been compromised or the manufacturer's expiration date has been reached.

(2) Items should be transported from an environmentally controlled area, via covered or enclosed cart with a solid bottom shelf, to another environmentally controlled area with limited access and restricted traffic.

(3) Items transported from an environmentally controlled area (via open baskets, by hand, or open carts with perforated bottom shelf) to areas with poor or inadequate environmental storage conditions or which do not have restricted traffic will be hermetically sealed or have envelope closure of all packaged items and be dated for 6 months. Items removed from plastic and not used will be reprocessed.

(4) All plastic used either as primary packaging material or protective cover will meet medical grade plastic specifications.

f. Dental treatment items in need of repair will be disinfected and sterilized prior to shipment to and upon receipt from maintenance.

g. Solutions. Preparation and sterilization of parenteral and irrigating liquids by health care facilities are discouraged. However, there may be instances where solutions must be processed in the health care facilities; for example, in emergency and field situations. In such instances, a quality assurance program must be implemented to assure sterility and nonpyrogenicity.

h. Reprocessing of single-use items. Single-use items will not be reprocessed and/or resterilized in the health care facility unless the manufacturer provides specific written instructions for processing and reusing these items. Only in emergency situations can single-use items be reprocessed for patient care use. This

emergency situation must be well-documented. Use DA Form 4106 (Report of Unusual Occurrence). (See AR 40-66.)

1-4. Universal precautions. Primary preventive measures (barrier techniques) protect the dental healthcare worker (DHCW) from direct contamination and infection; consequently, the following should be utilized:

a. All DHCWs will wear gloves when touching blood, saliva, or mucous membranes and when examining oral lesions. Gloves will also be worn when touching blood-soiled items, body fluids, and secretions, or when touching surfaces contaminated with these products. Repeated use of a single pair of gloves between patients is forbidden.

b. Surgical masks and protective eyewear will be worn at all times when treating patients to avoid the splattering of blood, saliva, or other body fluids.

c. Reusable gowns, laboratory coats, or uniforms will be worn when treating patients. When gowns are worn, they are to be sent to the installation laundry facility to be washed under controlled conditions. Gowns will be changed daily and more frequently if they are visibly soiled with blood. It is highly recommended that gowns, laboratory coats, and medical smocks be donned at the beginning of the day and removed at the end of the workday at the clinic.

d. Disposal protective smocks may be used while treating "high risk" (blood donor ineligible V7262) patients or other patients having a medical history indicating a probable risk. Disposal protective garments are not intended as replacement garments for the protective clothing provided under CTA 50-900 and CTA 8-100. Medical whites are available for issue to enlisted soldiers, civilian personnel, and contract ancillary personnel. Doctor smocks are available for issue to dentists. Fluid resistant clothing will be worn if there is a potential for clothing becoming soaked with blood or other potentially infectious materials.

e. Impervious-backed paper, aluminum foil, or clear plastic wrap should be used to cover surfaces that may be contaminated by blood or saliva and that are difficult or impossible to disinfect (for example, light handles or x-ray unit heads). These coverings should be removed between patients (while DHCWs are gloved), discarded, and then replaced after regloving).

f. All procedures involving manipulation of potentially infective materials should be carefully performed to minimize the formation of droplets, splatters, and aerosols. Rubber dams and high-speed evacuation should be used where appropriate.

g. It is recommended that all DHCWs having patient contact receive the hepatitis B vaccine.

1-5. Aseptic techniques. All DHCWs will utilize the following aseptic techniques.

a. The three-handwashing technique is recommended to avoid skin abrasion which promotes microbial entry when a DHCW is contaminated through defective gloves.

b. The three-handwashing procedure before gloving will be performed as follows:

- (1) Remove all rings.
 - (2) Wet the hands with cool to lukewarm water.
 - (3) Dispense 3 to 5 ml soap or antimicrobial surgical handscrub (4 percent chlorohexidene gluconate) into the right or left hand.
 - (4) Wash the right or left hand, carefully paying attention to wrist, knuckles, and around the fingernails for 15 seconds.
 - (5) Repeat the steps (1-4) for the other hand.
 - (6) Rinse the hands with cold water letting water run in the direction of the elbow.
 - (7) Repeat (1) through (6) two more times.
 - (8) Dry the hands with a disposable or sterile towel (one per hand).
 - (9) Use the last towel to close the faucet before disposal.
- c.* Glove according to the sterile gloving procedure.

d. Complete the steps in hands and nail care before leaving for the day.

- (1) Wet the hands with cool to lukewarm water.
 - (2) Dispense scrub solution into the right or left hand.
 - (3) Scrub the hand for 15 seconds each with a sterilized brush, concentrating around the nails and the cuticles, between fingers, etc.
 - (4) Clean under fingernails with a sterilized fingernail file.
 - (5) Rinse with cool water (about 10 seconds).
 - (6) Repeat (1) through (5) for the other hand.
 - (7) Scrub for a second time as in steps (1) through (5) for about 7 seconds.
 - (8) Repeat for the other hand.
 - (9) Dry the hands.
 - (10) Apply moisturizing hand lotion to the hands, giving special attention around the fingers. (Fingernails will be short and neat. DHCWs should not wear false nails or fingernail polish.)
- e.* Activities of DHCWs away from the treatment field (that is, chart writing, telephone usage, etc.) will be performed only after proper decontamination of hands by handwashing to prevent cross-contamination throughout the area.

CHAPTER 2

TECHNIQUES AND PROCEDURES

2-1. General. There are three distinct phases in/ the process of attaining effective disinfection and sterilization. Each phase has an important bearing on the outcome and end results of the total standardized technique. There can be no shortcuts and the process should be carried out in sequence with meticulous care and attention to detail.

2-2. Phase I—Decontamination. All instruments will be thoroughly cleaned to remove debris prior to sterilization and/or high-level disinfection.

a. DHCWs involved in cleaning and decontaminating instruments should wear heavy duty rubber gloves, mask, and goggles or glasses to prevent injuries.

b. Hinged dental instruments should be opened and then decontaminated like other instruments.

(1) Soak in cool detergent or disinfectant cleaning solution for at least 1 to 5 minutes with jointed instruments (that is, forceps or hemostats).

(2) Scrub individually with a stiff brush (denture type) under warm running water, being certain to remove all scale, debris, blood, saliva, and tissue.

(3) Ultrasonic devices can be used as an adjunct to remove the debris on instruments.

(4) Rinse instruments and items under warm running water to ensure thorough removal of all soap, detergent residue, or solution.

(5) Dry items thoroughly to prevent corrosion.

(6) Package instruments in appropriate bags.

(7) Seal package with heat sensitive indicator tape (that is, CI tape).

(8) Proceed with sterilization.

c. Syringes must be cleaned as follows:

(1) Disassemble the syringe hub and needle from cartridge barrel, discard the needle in an appropriate biohazard puncture resistant container, and then place the entire syringe in detergent.

(2) Scrub the syringe with a brush and detergent cleaning solution. A cotton-tipped applicator may be used to clean the cartridge barrel interior.

(3) Rinse the cartridge syringe under warm running water and dry it.

(4) Syringes may also be cleaned in an ultrasonic unit and properly rinsed.

(5) Dry the assembled unit.

(6) Place the assembled unit in an autoclave instrument bag and seal the bag with pressure sensitive indicator tape.

(7) As an alternative method, the syringe may be sterilized separately and the sterile disposable needle affixed just prior to the operation.

d. Needle and sharp items should be considered as potential infectious material and must be handled with special care.

(1) All disposable needles, syringes, scalpel blades, burs, sharp or broken instruments, and suture needles will be disposed in a puncture proof container located in proximity to utilization. Sharp items will be disposed per local SOP and AR 40-5.

(2) The biohazard container will be autoclaved before disposal.

(3) Disposable needles will not be recapped, unless a sterilized cap holder is used. The cap is placed in the holder and the group is placed on the tray so that the needle can be guided back into the cap without injury. The needle may also be recapped by holding the cap with forceps. Needles will not be bent or broken. Recapping needles increases the risk of unintentional needle stick injury.

(4) Needles will not be recapped between multiple injections but should be stored in a "sterile field" during treatment.

e. Anesthetic cartridges must be cleaned as follows:

(1) Upon opening of a prevacuum-sealed can, the cartridges can remain in the package container.

(2) A unit dose will be used for each patient and discarded after usage.

(3) Cartridges should not be stored in any chemical disinfectant because these can diffuse into the diaphragm and contaminate the anesthetic.

(4) Any cartridges showing signs of discoloration, precipitation, extrusion of the rubber plunger, corrosion of aluminum cap, or cracked glass should be discarded.

(5) Anesthetic cartridges used in the operating room can be autoclaved by steam. The cartridge should be wrapped snugly, so the rubber stopper does not have room to extrude during the steam process.

f. Rubber items must be cleaned as follows:

(1) Clean all items with detergent cleaning solutions using brushes when required.

(2) Rinse items and flush in warm water to remove detergent.

(3) Disposable rubber gloves should be used whenever possible. Disposable gloves should never be reused. Reusable rubber tubing is tested by air and water pressure per local SOP.

(4) Allow rubber items to drip dry out of direct sunlight. Blocks, stoppers, and plugs may be dried with absorbent towels.

(5) Place in a liquid sterilant.

(6) Rinse in sterile water.

- (7) Dry in a sterile towel.
 - (8) Preserve in sterile hermetic containers.
 - (9) Rubber gloves can be sterilized by steam after proper washing, testing, drying, dusting with corn starch, and wrapping.
 - (10) Nitrous oxide mask and tubing.
 - (a) If autoclavable, clean with a mixed detergent and disinfectant.
 - (b) Rinse.
 - (c) Dry.
 - (d) Package and seal with CI tape.
 - (e) Autoclave.
 - (11) Alternative (if mask and tubing are not autoclavable):
 - (a) Clean as above.
 - (b) Immerse in an intermediate disinfectant.
 - (c) Tubing and mask will be rinsed in and out.
 - (d) Dry in the open air.
 - (12) Items that cannot be steam autoclaved can be gas sterilized. (Local arrangements may have to be established to send items to the hospital for gas sterilization.)
 - (13) After gas sterilization, an aeration period must be allowed.
 - (14) Disposable rubber products (for example, prophylaxis cups) should be discarded after each patient.
- g. Cotton and textile items must be cleaned as follows:
- (1) Gauze packs, sponges, and cotton rolls may be placed in the sterilizing cycle directly from manufacturers' packages; however, they should be used at the patient site by unit doses.
 - (2) Suture material is usually purchased in individually presterilized packages. Suture materials of cotton and silk can be made from spools in the desired length which is threaded in a suture needle and wrapped on cotton rolls. The above should be packaged and steam sterilized.
- h. Towels and drapes (freshly laundered) should be packaged and sealed with a chemical indicator before sterilization.
- i. Stones will be cleaned like other dental instruments, dried, packaged, and sealed with a CI before sterilization.
- j. Burs, rotating cutting instruments, and diamonds are considered semicritical items and require a high level of disinfection. The following steps should be performed after each patient:
- (1) Remove debris with an eraser or rubber product.
 - (2) Rinse under water.
 - (3) Place on a bur block of metal or plastic in an ultrasonic unit to remove debris.
 - (4) Instruments should *not* be allowed to rub against each other in the unit because it will cause cutting edges to become dull.

- (5) Rinse under running water.
 - (6) Dry.
 - (7) Package and sterilize in chemicalclave or with gas.
 - (8) Alternative, liquid disinfectant (for appropriate length of time and concentration).
 - (9) Rinse in sterile water.
 - (10) Dry in a sterilized towel.
 - (11) Package and store.
- k. High and slow speed handpieces are the most difficult to clean. Neglecting these items can cause cross-contamination. Most handpieces are autoclavable. Manufacturers' instructions must be followed to maximize handpiece life.
- (1) When handpieces are not autoclavable, the following cleaning and disinfecting procedures will be completed between each patient.
- (a) Flush the high speed handpiece by discharging water into a sink or container for 20 to 30 seconds.
 - (b) Scrub (with a brush) the handpiece (cone, contra and prophylaxis angle) with detergent and water to remove debris. Do not wash or immerse engine (just wipe).
 - (c) Rinse with water.
 - (d) Dry.
 - (e) Thoroughly wipe the handpiece with an iodophor soaked pad (that is, Wescodyne or Biocide) or other hospital disinfectant "that is mycobactericidal at recommended dilutions."
 - (f) Allow the handpiece to dry in open air for 10 minutes.
 - (g) Remove any stain or excess solution with alcohol.
 - (h) The prophylaxis angle should be autoclaved after each patient.
 - (2) These steps should occur after each patient.
 - (3) High speed tubing should be bled before the first patient in the morning for 5 minutes and should also be bled 15 seconds between patients.
- l. Evacuation tips are semi-critical and should be cleaned and autoclaved after each patient. Clean the small opening of a suction tip with a small brush or wire before the sterilization and disinfection process.
- m. In dental radiology, cross-contamination within the x-ray process is quite possible; therefore, the following procedures will be utilized:
- (1) *Hand washing.* A rigid hand washing policy must be followed by all personnel involved with radiology patients.
 - (2) *Film holding devices.* Autoclavable film holding devices will be sterilized between each patient.
 - (3) *Disinfection.* All items that are not autoclavable should be immersed in an intermediate-level disinfectant between each patient.
 - (4) *Panoramic unit bite blocks.* Cover with a

disposable plastic bite block and change between each patient. If covers are not available, sterilize or utilize an intermediate disinfectant.

(5) *Intraoral film packets.* After removal from the patient's mouth, the film packet should be placed in a disposable container (that is, paper cup) for transfer into the darkroom. Wrappers should be discarded into a disposable container to prevent cross-contamination of counter top or developing unit.

(6) *X-ray chair, armrests, and headrest.* These should be disinfected after each patient or covered with plastic which is replaced after each patient.

(7) *Intraoral x-ray tubehead and exposure buttons.* These should be disinfected after each patient. When feasible, plastic covers will be removed and replaced after each patient. Caution should be taken not to spray liquid disinfectant into the tubehead or electric exposure buttons.

n. Non-critical fixed dental equipment (that is, switch, light handle, tray, xray, cone, etc.) should be disinfected after each patient. (Paper liners will not be stacked on unit trays but used one at a time for each patient to avoid cross-contamination.)

(1) Amalgamator, ultraviolet light, dental air or water syringe handles, saliva ejector coupling, unit switches, and chair control should be wiped with disinfecting solution or wrapped between each patient.

(2) Headrest and bracket tray covers whether plastic or paper will be changed after each patient.

(3) Countertops and surfaces that have become contaminated with blood or saliva will be wiped with absorbent towels to remove extraneous organic material, then disinfected with a suitable chemical germicide. A 5,000 parts per million (numeric:9 dilution) solution of sodium hypochlorite (household bleach) prepared fresh daily is an effective germicide. Caution should be exercised since sodium hypochlorite is corrosive to metals and irritating to the skin.

(4) Dressing cans, basins, and other storage containers.

(a) Wash thoroughly in surgical detergent or disinfectant cleaning solution.

(b) Remove stains and marks with scouring powder. Stainless steel wool in (grades 00 or 000) may be used to remove encrusted areas on metal surfaces.

(c) Rinse thoroughly in hot running tap water and invert on a rack or perforated surface to air dry.

(5) Protective eye wear of patient and DHCWs should be decontaminated, rinsed, drip dried and disinfected in 29 percent glutaraldehyde. (Glutaraldehyde is the only disinfectant that will not change the lens color.)

(6) Ultrasonic scalers, electrosurgery instruments, light-curing units, air and water syringes and other items will be disinfected between patients in a method similar to handpieces.

(a) Ultrasonic hoses and air and water syringes will be cleaned and bled at the beginning of treatment day and between each patient to remove salivary bacterial contaminants from the water line.

(b) Ultrasonic scalers will be autoclaved after each patient.

(c) Air and water syringe tips should be autoclaved when autoclavable.

2-3. Phase II—Sterilization. After completion of the decontamination process (Phase I) which will be performed in a properly designated area (preferably a separate room or a designated space within a room), dental items requiring sterilization should be moved to a separate control area for the sterilization process (Phase II). Initiation of Phase II starts with packaging as follows:

a. The function of a package containing a sterile medical item is to assure that the contents are maintained in a sterile condition until the package is intentionally opened; provisions must be made for the contents to be removed without contamination.

b. Users must evaluate the many packaging materials available and select those best suited to their needs. Packaging material of reusable woven fabrics must be laundered between uses. Factors to be considered include—

(1) Suitability for the sterilization method used. The material must provide for adequate air removal and sterilant penetration.

(2) Adequacy of barrier to microorganisms or their vehicles.

(3) Resistance to tear or puncture.

(4) Proven seal integrity.

(5) Ease of aseptic presentation. The package must be flexible and memory free.

(6) Absence of toxic ingredients and nonfast dyes.

(7) Economic.

c. Chemical sterilization does not require packaging; nevertheless, strict guidelines should be followed.

2-4. Phase III—Storage and care of sterile instruments and materials. The disinfection and sterilization process is of little value unless proper attention is directed to the safekeeping of sterile instruments and materials. All instruments and materials will be handled from the sterilizing or disinfecting cycle with mask and sterile gloves.

a. Storage areas should be in dustproof, dry or well-ventilated areas, and easily accessible for routine dental use. Sufficient space in drawers or racks should be available to allow for rotation of bags and packs so the oldest items through the sterilization cycle are the first used.

b. Sterile materials should be stored at least 8 to 10 inches from the floor, at least 18 inches from the ceiling, and at least 2 inches from outside walls.

c. Items should be positioned so that packaged items are not crushed, bent, compressed, or punctured.

d. Items must not be stored in any location where they can become wet.

e. Items should be stored on designated shelving cabinets or covered containers that are cleaned and maintained in a dry condition.

f. Outside shipping containers and corrugated cartons should not be used as containers in sterile storage areas.

g. Open shelved storage may be used in an environmentally controlled area with limited access and restricted traffic. Closed shelf storage will be used if conditions for open shelf storage are not met.

h. Wrapped autoclaved materials should be positioned in storage areas so the label and dating entry are readily visible and easily inventoried. Wrapped materials will not be disturbed until required for operational use unless the packages become outdated.

2-5. Factors contributing to failures. Common causes of failure in disinfection and sterilization are—

a. Inadequate preparatory steps before the disinfection and sterilization processes are attempted.

b. Improper packaging, loading, and placement of instruments or materials in the disinfection and sterilization containers.

c. Failure to time the periods of cycle exposure correctly.

d. Lack of attention to the orderly, step-by-step

sequence in the operational techniques.

e. Failure to understand the limitations, capabilities, and requirements of the disinfection and sterilization means to attain an absolute goal.

f. Inadequate attention to details and controls on storage and dating of materials processed in a sterilization and disinfection cycle.

2-6. Consideration for proper sterilization. a. Intelligent, painstaking efforts and professional discipline.

b. Cleanliness of the material's surface being processed.

c. Composition and nature of item subjected to the procedure.

d. Physical and chemical factors in the surrounding environment or medium being treated.

e. Time the material is exposed to a disinfection or sterilization agent.

f. Shelf use and reuse life of the disinfectant.

g. Concentration and type of contaminant.

h. Concentration and temperature of the solution or gas (chemical agent).

i. Steam temperature and pressure.

j. An adequate drying cycle.

k. A clear understanding and observation of the procedure by the users.

l. Rinsing of instruments sterilized by liquid in sterile water.

m. Drying of instruments in sterile towels.

n. Proper storage of sterilized instruments.

CHAPTER 3

INFECTION CONTROL IN DENTAL CLINICS, DENTAL LABORATORIES, AND AREA DENTAL LABORATORIES

3-1. Barrier requirements. *a.* Infection control must be performed on all material entering and exiting in the laboratory to ensure proper use of the barrier system which includes the following:

- (1) Personnel have HBV immunization.
- (2) Meticulous personal hygiene.
- (3) Eye protection.
- (4) Mask.
- (5) Gloves.
- (6) Disposable aprons or gowns.
- (7) Avoidance of material cross contamination.
- (8) Astute control of cases upon receipt, laboratory distribution, and shipping.

b. The barrier system should be initiated in the operatory and continue to the laboratory as follows:

(1) Prosthetic treatment items (that is, casts, prostheses, orthodontic appliances, etc.) will be thoroughly rinsed and debrided under running water prior to being taken to the laboratory.

(2) All prosthetic treatment items will transfer through a disinfection area upon entry to and exit from the laboratory. A sink with an overlying drain board is an excellent disinfection location.

3-2. Disinfection procedures. Disinfection will be performed on the items as follows whenever feasible:

a. The prosthetic treatment items should be placed on the drain board with casts standing on end so that disinfectant will not pool in the palatal and lingual areas. All surfaces of casts, prostheses, and other materials are sprayed with a hard surface iodophor solution. The solution should be permitted to remain on the materials for 10 minutes before rinsing with water. (Although hard-surface iodophors are EPA-approved for ambient use, technicians should use a face mask during the spray procedure.)

b. Impression material will be discarded as contaminated waste. Reusable trays will be scrubbed, rinsed, and soaked in a disinfectant prior to being sealed in transparent tubing. All impression trays will be sterilized.

c. Prostheses should be polished with pumice which is suspended in iodophor. This approach helps guard against contamination of the pumice and makes it unnecessary to discard the pumice between cases. The pumice should be changed daily or more often when the workload is heavy.

d. Following polishing, the prosthesis should be cleaned in an ultrasonic cleaner and rinsed in water. The prosthesis should then be placed in a glass beaker of hard-surface iodophor solution for a contact time of at least 10 minutes (only 5 minutes is necessary if the beaker containing the prosthesis is placed in the ultrasonic cleaner). The iodophor should not be placed directly into the ultrasonic cleaner since deactivation of the disinfectant could occur. Following removal from the disinfectant, the prosthesis should be thoroughly rinsed and enclosed in a plastic bag or PVC wrap prior to placement in the shipping box.

3-3. Rushed cases. Cases that are "rushed" or receive minor modifications and repolishing cannot compromise infection control. To avoid cross-contamination, the pumice pans used for these cases should be lined with disposable plastic liners for single patient use and a minimum of 20-minute turn around time should be anticipated to utilize the barrier system.

3-4. Contact areas and benches. Case contact areas and shipping and receiving benches should be disinfected daily. The surface should be precleaned by swabbing with a disposable towel or gauze saturated with hard surface disinfectant, or by spraying, then spreading the spray with disposable towels. (Personnel performing these procedures should be gloved and masked.) The disinfectant should be allowed to remain in contact with the surface for 10 minutes. An alternate approach is to disinfect the workbench at the end of each day, permitting the disinfectant to remain overnight. The disinfectant can be readily removed the next morning with a pad wet with alcohol. Identical procedures should be used to disinfect metal case pans.

3-5. Direct patient care facilities. Dental laboratories associated with direct patient care will take the necessary precautions to avoid cross contamination and infection. Solid wastes contaminated with blood or saliva will be placed in impervious bags for proper disposal. Also, separate sets of instruments, attachments, and materials should be used for new prostheses and will be used for cases that have been in the mouth. The instruments and attachments will be disinfected between uses by using iodophor solution for 10 minutes and rinsing with water. Brushes and other equipment that have been used with prostheses that have been in the mouth will be cleaned and disinfected as in paragraph 3-2.

APPENDIX A

REFERENCES

Section I. DEPARTMENT OF THE ARMY

AR 25-400-2 (The Modern Army Recordkeeping System (MARKS)).

AR 40-5 (Preventive Medicine).

AR 40-66 (Medical Record and Quality Assurance Administration).

CTA 8-100 (Army Medical Department Expendable/Durable Items).

CTA 50-900 (Clothing and Individual Equipment).

FM 8-38 (Centralized Materiel Service/Section).

TB 38-750-2 (Maintenance Management Procedures for Medical Equipment).

Section II. BISERVICE (DENTAL CORPS OR DENTAL SERVICE)

U.S. Air Force Dental Service (Infection Control Program, Dental Items of Significance, April 1986).

U.S. Army Dental Corps (Infection Control in Army Dental Treatment Facilities and Dental Laboratories).

Section III. NATIONAL AGENCIES

Centers for Disease Control (Recommended Infection Control Practices for Dentistry MMWR 18:35-15:237-42, April 1986).

Centers for Disease Control (Recommendations for Prevention of HIV Transmission in Health Care Settings MMWR 34:313-335, 1985).

Centers for Disease Control (Update on Hepatitis B Prevention MMWR 36(23):353:360, 366, 1987).

Council on Dental Materials, Instruments, and Equipment; Council on Dental Practice; Council on Dental Therapeutics (Infection Control Recommendations for the Dental Office and the Dental Laboratory (JADA, Vol. 116, February 1988)).

Council on Dental Therapeutics; Council on Prosthetic Services and Dental Laboratory Relations (Guidelines for Infection Control in the Dental Office and the Commercial Dental Laboratory. Journal American Dental Association 110:969-972, June 1985).

Joint Commission on Accreditation of Healthcare Organizations (Accreditation Manual for Hospitals).

U.S. Department of Health and Human Resources (Guidelines for Infection Control in the Dental Office and the Commercial Dental Laboratory. Journal of the American Dental Association 110:969-972, June 1985).

Section IV. INDIVIDUAL

Cottone, James A. (*Infection Control in Dentistry*. U.S. Department of Health and Human Services, Oct 1986).

Gleason, Michael J., Molinari, John A. (*Stability of Safety Glasses During Sterilization and Disinfection*. Journal American Dental Association 115, July 1987).

Sabatini, Bernard M., CDT. (*Practical Application of Infection Control Guidelines in the Dental Laboratory*. U.S. Department of Health and Human Services, Oct 1986. Proceedings National Conferences on Infection Control in Dentistry. Chicago, Ill., May 13-14, 1986).

GLOSSARY

Section I. ABBREVIATIONS

AIDS.....	acquired immunodeficiency syndrome	JADA.....	Journal of the American Dental Association
BI	biological indicator	JCAHO	Joint Commission on Accreditation of Healthcare Organizations
CDC	Centers for Disease Control	ml	milliliter(s)
CI	chemical indicator	MMWR	Morbidity and Mortality Report
DHCW	dental healthcare worker	psi	pounds per square inch
EO.....	ethylene oxide	PVC	Poly Vinyl Chloride
EPA	Environmental Protection Agency	SOP.....	standing operating procedure
HBV	Hepatitis B Virus	VD.....	venereal disease
HIV.....	human immunodeficiency virus		

Section II. TERMS

Several terms, with overlapping meanings, are in use to define the action of physical and chemical agents upon living organisms. The terms used in this bulletin are defined as follows:

Barrier techniques. Different items used to protect individuals from contaminants.

Biological indicator. A calibration of highly resistant microorganisms being used to monitor different sterilization processes and to help assure optimum sterilization cycles.

Chemical indicators. A sensitive chemical or ink used to indicate that a cycle of sterilization occurred. This process does *not* assure sterilization but acts as an adjunct to the BI.

Cleaning. Physical removal of organic substance or dirt from objects.

Dental items (dental devices, instruments, equipment). Classifications according to Spaulding are classified with the pathway of cross-contamination, location, and technique being used:

a. Critical. Any instruments that are introduced into the bloodstream or into a sterile area of the body.

b. Semicritical. Any instruments or devices that come in contact with any mucosal tissues. Those instruments have to be noninvasive.

c. Noncritical. All instruments or equipment that doesn't come in direct contact with the patient; that is, light handle, x-ray cone, etc. (This does not mean that it is *not* important to clean.)

Disinfection. Intermediate technique between physical cleaning and sterilization. Destruction of harmful organisms from inanimate surfaces.

a. The EPA has the responsibility to classify the

different liquid disinfectants based on their biocidal activities. These classifications are—

(1) *High-level disinfectant.* Biocidal against all microorganisms and used for critical and semicritical items.

(2) *Intermediate level disinfectant.* Biocidal but usually not sporicidal and should be used for semicritical or non-critical items.

(3) *Low-level disinfectant.* Agents not effective against any of the mycobacterium tuberculosis, spores, the nonliquid viruses and should be used only on non-critical items.

b. Three terms are applicable regarding usage of liquid disinfectant and sterilant.

(1) *Shelf life.* Storage time without activation that a disinfectant remains unaltered for usage.

(2) *Use life.* Number of days that a liquid disinfectant can be stored after activation to remain efficient; that is, Cidex has a 28-day use life after activation.

(3) *Reuse life.* Refers to the number of loads treated in the disinfectant after activation; that is, 100 loads, 100 loads is the limit when the solution needs to be discarded (even if the 28 days of use life was not reached).

Exposure time. Is total continuous time material is exposed to the prescribed sterilization medium method.

Restricted access areas (limited traffic area). An isolated room or area dedicated to sterile supply storage that can be closed off from the main traffic corridors. Access is limited to authorized personnel.

Sanitary. Articles and materials are considered sanitary when infectious residue contamination capable of harming living tissue or debris which is esthetically

objectionable is removed or reduced to safe levels by disinfecting or cleaning.

Sterile. Free from all living organisms.

Sterilization. Destruction of all forms of microorganism life.

Woven material. See FM 8-38.

Sterile. Free from all living organisms.

Sterilization. Destruction of all forms of microorganism life.

Woven material. See FM 8-38.

The proponent agency of this bulletin is the Office of The Surgeon General. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to HQDA (DASG-DC), 5109 Leesburg Pike, Falls Church, VA 22041-3258.

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

WILLIAM J. MEEHAN II
Brigadier General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-34C-R, requirements for TB MED
() series: Dental Service.

